

CLAIMS:

1. A solution for forming a chromate-free, corrosion resistant coating on a product formed from magnesium or a magnesium alloy, comprising:

the solution having phosphate and fluoride ions; and
an active corrosion inhibitor selected from the group consisting of organo-phosphonic acids.

2. A solution according to claim 1, wherein the organo-phosphonic acid is selected from the group consisting of straight chained amino-alkyl phosphonic acids, branched amino-alkyl phosphonic acids, straight chained alkyl phosphonic acids, branched alkyl phosphonic acids, triphosphonic acids, and mixtures thereof.

3. A solution according to claim 2, wherein the triphosphonic acids comprise nitrilotris (methylene) triphosphonic acid (NTMP).

4. A solution according to claim 1, wherein the solution includes vanadate.

5. A solution according to claim 1, wherein the solution comprises 1 ppm to 1 wt% of the corrosion inhibitor, preferably 10 ppm to 0.5 wt%.

6. A solution according to claim 5, wherein phosphate ions are present in an amount of between 1 g/L to 50 g/L, preferably between 10 g/L to 25 g/L, and the fluoride ions are present in an amount of 1 g/L to 10 g/L, preferably 3 g/L to 5 g/L.

7. A process for preparing a corrosion-resistant, chromate free, coating on magnesium or a magnesium alloy substrate comprises treating the substrate with the solution of claims 1 through 6, wherein the phosphonic acid group reacts with magnesium metal forming an insoluble salt.

8. An article comprising the magnesium or the magnesium alloy substrate having a corrosion coating prepared in accordance with the process of claim 7.